

METHODS AND APPARATUS FOR OPERATING AND PERFORMING DIAGNOSTICS IN A CONTROL LOOP OF A CONTROL VALVE

Abstract

A control loop of a control valve is operated using outlet pressure from a
5 pneumatic amplifier as the control parameter. The control loop may be operated
continuously in pressure control mode, or may be switched from another mode, such
as travel control mode, to pressure control mode in response to certain operating
conditions such as operation in the cutoff range, operation with the throttling element
engaging a travel stop, or as a backup in the event of primary control parameter sensor
10 failure. Operating the control loop in pressure control mode further allows
diagnostics to be performed on the control loop components, even when the system is
operating in cutoff range or has engaged a travel stop. The diagnostics may be
performed using pressure and displacement sensors normally provided with a
positioner. A processor may be programmed to receive data from the sensors and
15 generate fault signals according to a logic sub-routine. The logic sub-routine may
include calculating mass flow of control fluid through pneumatic amplifier outlet
ports and comparing other operating parameters to detect leaks and blockages in the
control loop components. Once a fault is detected, the location of the root cause of
the fault may be identified by characterizing operating parameters of the control loop
20 at the time of the fault.